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A REVERSED ALMOST WHOLLY AMBICOLORATE SUMMER FLOUNDER, *PARALICHTHYS DENTATUS*

BY E. W. GUDGER

This specimen, the most abnormal flounder that has ever come into my hands, was taken at Freeport, Long Island, July 21, 1935. It was presented to the Museum by Mr. Lawrence Mortimer of Garden City, Long Island, to whom go my best thanks for this remarkable specimen. It is most abnormal in that it is reversed—i.e., it points to the right when it should point left; and it is ambicolorate—i.e., its under surface, instead of being white, is almost wholly dark.

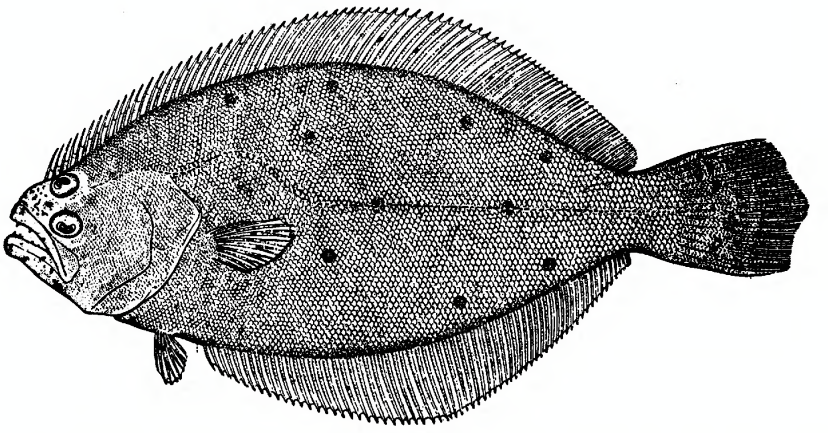

Fig. 1. Upper side of a normal *Paralichthys dentatus*. The normal fish is left-handed, i.e., the fish points left and has eyes and color on the left side.
After Jordan and Evermann, 1900.

THE NORMAL FISH

In order that the reader may have a basis for understanding just how abnormal this specimen is, it will be necessary to give a figure and brief description of the normal fish. This, as shown in Fig. 1, is a sinistral, left-pointing or left-handed fish, having eyes and color on the left side and the right side blind and colorless. The color of the upper side varies with the bottom on which it is found, but in its southern range at

any rate it is generally a light olive with many small white spots on the body, and still smaller ones on the vertical fins (not shown, however, in the figure). In addition there are on the upper side 10 to 15 rather large dark spots with white borders.

P. dentatus is a western Atlantic flounder ranging from Massachusetts (Cape Cod) to Florida. Except the halibut, it is the largest of our east coast flatfishes. It grows to a length of 3 ft. and a weight of 26 lbs., but the average weight is about 3 lbs. My specimen measures 15 in. over all, and weighs 1 lb. 1 oz. It is then a comparatively small summer flounder.

THE REVERSED FISH

Since this specimen is abnormal on both sides it will be necessary carefully to study both surfaces. That side will be taken up first which the observer would see first.

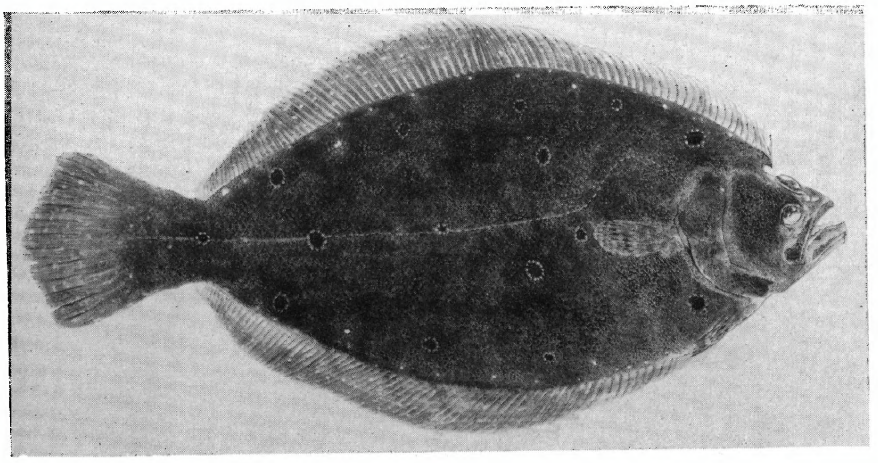

Fig. 2. The upper, or eyed and colored side of the reversed or right-handed summer flounder. Note the number and position of the spots, also the hooked dorsal fin and the incompletely rotated eye.

A.—The Upper or Dark Side

Fig. 2 shows that the normally left-handed *P. dentatus* has become right-handed in this specimen. It is eyed and colored on the right side instead of on the left. In reversal the color of the left side has come over to the right. This is not an unusual phenomenon in flatfishes, but in this specimen it is noteworthy that the spots normal to the left side have come over along with the general coloration to the right side.

Noticeable are the 15 large dark spots with white rings. Three of these are on the lateral line; and if this ran straight forward to the mouth, then a fourth would also be on it. Four are found well up toward the base of the dorsal, and four near the anal fin. Further these dorsal and anal spots show a certain bilaterality with reference to the median line of the body and with regard to each other. Then along the bases of dorsal and anal fins, and on these fins, are many small white spots of indeterminate number. Presumably in the normal fish there is some variation in the number and arrangement of these spots. What and where these would have been on a normal fish, one cannot say, but I dare conjecture that their number and arrangement in this reversed specimen are what they would have been on the left side of this fish had it not been reversed.

In ambicolorate flounders, specimens have been recorded in which dorsal spots have been reproduced on the ambicolorate lower surface. But this seems to be the first figure and record showing the reproduction of spots on a reversed flounder. At least I found none in a recent paper[1] on reversal, in which I studied every account that I could find of this phenomenon.

When this reversed flounder is looked at from its functional upper side, one sees not merely that this side is colored, but that the head shows certain anomalies. Compared with the normal fish, the travelling eye has not come over to its normal position but has stopped nearly on the dorsal crest. Furthermore the anterior end of the dorsal fins ends in a curious hook. Attention is called here to these anomalies; they will be discussed in the next section.

B.—The Lower or Ambicolorate Side

Even after a year in alcohol the under side of this fish is of a decidedly olive hue. The color is lighter than that of the upper side, but it is surely ambicolorate. As Fig. 3 shows, the under side is everywhere dark save for the white on the hinder part of the pectoral fin and on the head proper. On the top of the head, the dark color comes over from the upper side—barely over in front of the eye, but markedly over under and behind the eye and under the hooked dorsal fin. The dark color covers the opercles and the lower jaw. In other words the white head proper is framed in dark.

Of particular interest is the number (15) of the large spots on the

[1] Gudger, E. W. 'Abnormalities in Flatfishes (Heterosomata). I. Reversal of sides: a comparative study of the known data.' Jour. Morphol., 1935, LVIII, 1–39, 5 figs.

lower side of this fish. About 12 of them in their positions fairly duplicate those of the upper side. The careful insertion of a needle through the center of each of the 12 lower spots shows that each is a duplicate of that on the upper side. Sometimes the needle comes out squarely in the center of the upper spot, sometimes the lower is placed eccentrically with regard to the upper spot, and in a few cases the needle narrowly misses the upper spot. But the spots on the lower side surely in a fairly accurate way duplicate those above.

Also of especial interest are the head anomalies. The left or rotating eye has its left edge just on the dorsal ridge, so evidently so that the eye is plainly visible from the blind side. Overhanging the hinder edge of the eye is the hooked anterior part of the dorsal fin. The point of the hook is curiously enough white on the lower side but it is dark on the upper side.

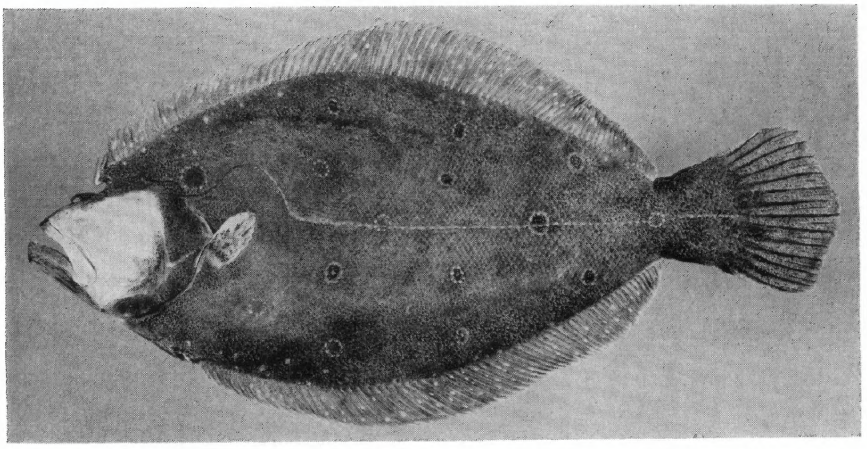

Fig. 3. The left or lower ambicolorate side of this reversed summer flounder. The whole lower side is dark save the central part of the head and the piebald pectoral fin. Note the number and position of the spots. The rotating eye is still visible and is overhung by the hooked dorsal fin.

This almost wholly ambicolorate flounder in its color and its head anomalies conforms to the general rule. This is that when the whole lower body and approximately one-third of the head is dark, then there will be found an incompletely rotated eye and a hooked dorsal fin.

This specimen is unique among flounders. There has been but one other reversed ambicolorate flatfish described. In 1907, Cunningham[1]

[1] Proc. Zool. Soc. London, pt. 1, pp. 174–181, 2 figs.

figured and described a reversed turbot partially ambicolorate on the blind side and white on the eyed side. However, it was only 44 mm. (1.7 in.) long—hardly more than a post-larval fish, whereas my specimen is an adult. In addition to the flounder herein described, I have two reversed partially ambicolorate halibuts. These will be described later, and still later I plan to bring together and study all these reversed ambicolorate flatfish in the endeavor to find an explanation of this double anomaly.